

## **Supplemental Procedures**

### **Mice**

All mice used in the study are on a C57BL/6 genetic background. *Mir155*<sup>f/f</sup> mice were created by Taconic by introducing loxP sites upstream and downstream of the miR-155 producing exon of *BIC* (schematics and sequence information in **Figure 4, S4 and Table S1**). In brief, 30 µg of NotI-linearized final targeting vector DNA was electroporated into ~10<sup>7</sup> C57BL/6 ES cells and selected with 200 mg/ml G418. Two plates of G418 resistant ES clones (~192) were selected for screening. The primary ES screening was performed with 3' PCR and distal LoxP PCR. Approximately twenty potential targeted clones were identified from one plate. Six clones were expanded for further analysis. Upon completion of the ES clone expansion, additional Southern and PCR confirmation analysis was performed. Based on this analysis, all six expanded clones were confirmed for homologous recombination with single neo integration. Flp electroporations were performed on two clones. Two Neo deleted clones were identified and confirmed by PCR upon expansion (**Figure S4**).

### **Histological analyses**

Spleen, liver and kidney samples were placed in a 10% formalin solution immediately after harvesting, fixed for 24 hours, rinsed in PBS and placed in 70% ethanol.

### **Flow Cytometry**

Fluorophor-conjugated antibodies against CD45.1, CD45.2, CD11b, Gr1, CD4, CD3ε, CD8, CD62L, Icos, CD44 and CD69 (all from Biolegend) were used to stain RBC-

depleted splenocytes, LN cells, BM cells and peripheral blood cells. Germinal center B cells were identified by staining with antibodies against GL7 (ebioscience), FAS (BD Pharmagen), IgD (Biolegend) and B220 (Biolegend). The Tfh cells were identified by staining with antibodies against CD3 $\epsilon$ , CD4, CXCR5 (ebioscience) and PD-1 (Biolegend), or CD3 $\epsilon$ , CD4, Icos, PD-1 and Bcl6 (BD Pharmagen), and gating based on isotype or unstained controls.

### **ELISAs**

Briefly, serum samples were added in a 5-fold serial dilution onto plates pre-coated with 4  $\mu$ g/ml Ova. After incubation and washing, biotinylated anti-mouse IgG or IgG1 antibodies (SouthernBiotech) were added and incubated for 2 hrs at room temperature followed by 1 hr of Streptavidin-HRP (SouthernBiotech) incubation. Detection reagent and stop solution (eBioscience) were added according to the manufacturer's instructions, and the signal detected using a plate reader.

### **RNA Sequencing**

For the RNA-seq experiments, CD3 $\epsilon^+$ CD4 $^+$  T cells were FACS sorted (using a BD FACSAria II) from the spleens of 10 months old mice of the indicated genotypes. In a separate experiment, CD4 $^+$  T cells were first purified from both Wt and *Mir155* $^{-/-}$  mouse spleens on day 8 post Ova-immunization by using a CD4 $^+$  T cell negative selection kit (Miltenyi). CD4 $^+$ CXCR5 $^+$ PD1 $^+$  Tfh and CD4 $^+$ CXCR5 $^-$ PD1 $^-$  non-Tfh cells were FACS sorted from Wt and *Mir155* $^{-/-}$  CD4 $^+$  T cells (n=7 for each genotype per sample).

For the reference generation, Ensembl transcript annotations for mm10 were downloaded from the UCSC table browser (release 73). Gene annotations were created by merging transcripts with the same gene identifier using the USeq (v8.8.7) MergeUCSCGeneTable application. All possible splice junction sequences from each gene's transcripts were generated with the USeq (v8.8.7) MakeTranscriptome application using a radius of 46. These splice junction sequences were added to standard mm10 chromosome sequences and run through novoindex (v2.8) to create the transcriptome reference index.

For the RNA-Seq analyses, reads were aligned to the transcriptome reference index described above using Novoalign (v2.08.01), allowing up to 50 alignments for each read. The USeq (v8.8.7) SamTranscriptomeParser application was used to select the best alignment for each read and to convert the coordinates of reads aligning to splices back to genomic space. Differential gene expression was measured using the USeq (v8.8.3) DefinedRegionDifferentialSeq (DRDS) application, modified to report non-variance stabilized log2 ratios. Briefly, DRDS first determines the numbers of reads aligning to each gene annotation. DRDS then calls DESeq (v1.12.1), which normalizes the signal and determines differential expression.

## **Immunoblotting**

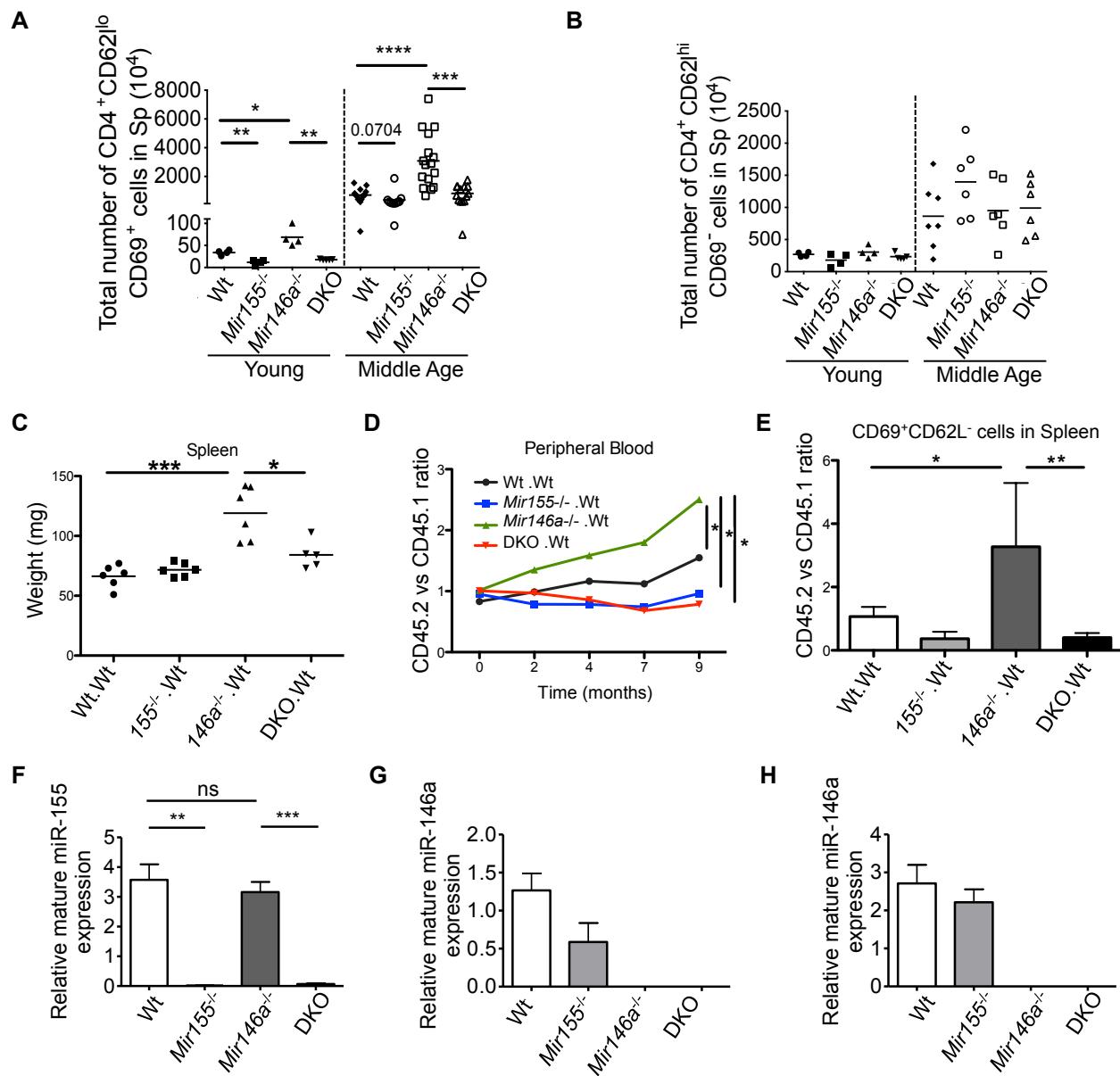
CD4<sup>+</sup> T cells were isolated from mouse spleens using a CD4<sup>+</sup> T cell negative selection kit (Miltenyi). Cells were cultured in complete RPMI supplemented with plate-bound  $\alpha$ CD3ε (5 µg/ml) and soluble  $\alpha$ CD28 (2 µg/ml) for activation. RIPA buffer (50 mM Tris-HCl pH 7.4, 1% Nonidet P40, 150 mM NaCl, 1 mM EDTA, 10% sodium deoxycholate,

freshly added with 1 mM phenylmethylsulphonyl fluoride (PMSF), 1 mM Na<sub>3</sub>VO<sub>4</sub> and 1 mM NaF) was used for lysis. Extract was used for Immunoblotting.

### **Ova Immunization**

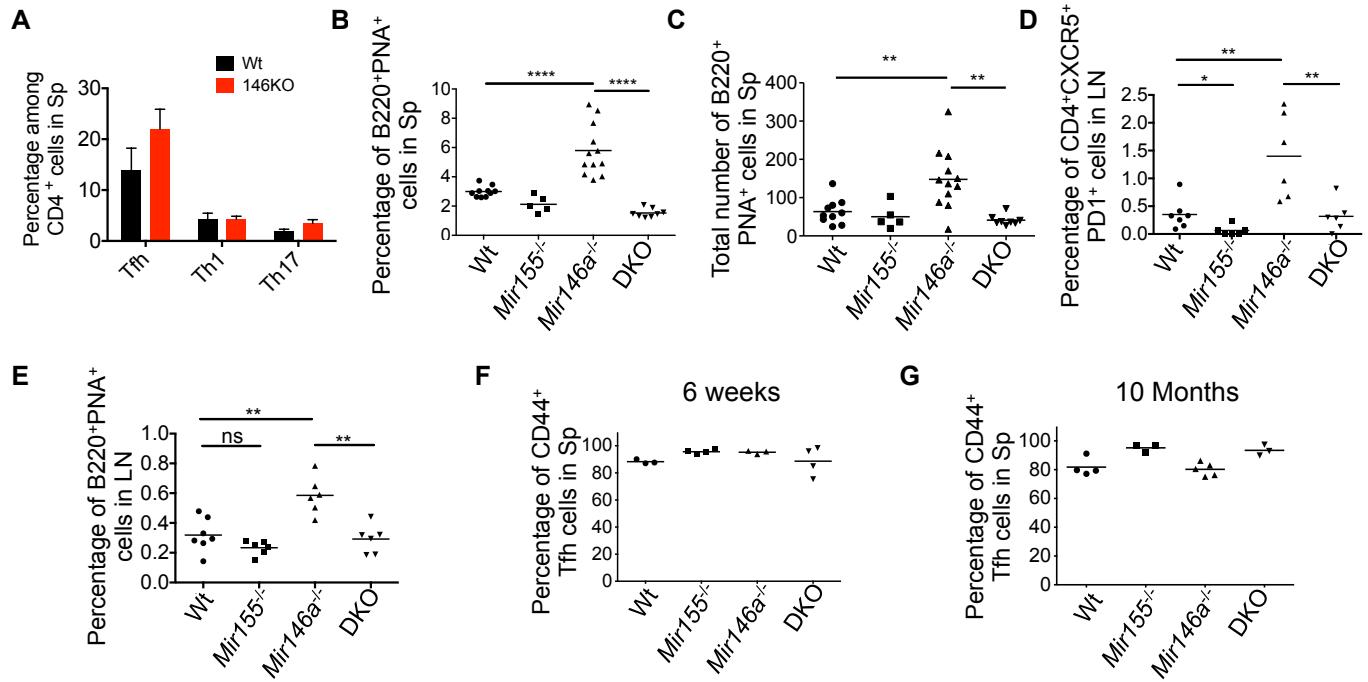
Eight days after immunization, mice were sacrificed and analyzed individually. Another group of mice was bled on days 14, 21 and 28 to detect Ova-specific total IgG or IgG1 antibodies. Mice were boosted on day 21 with Ova in PBS.

**Figure S1, related to Figure 1**



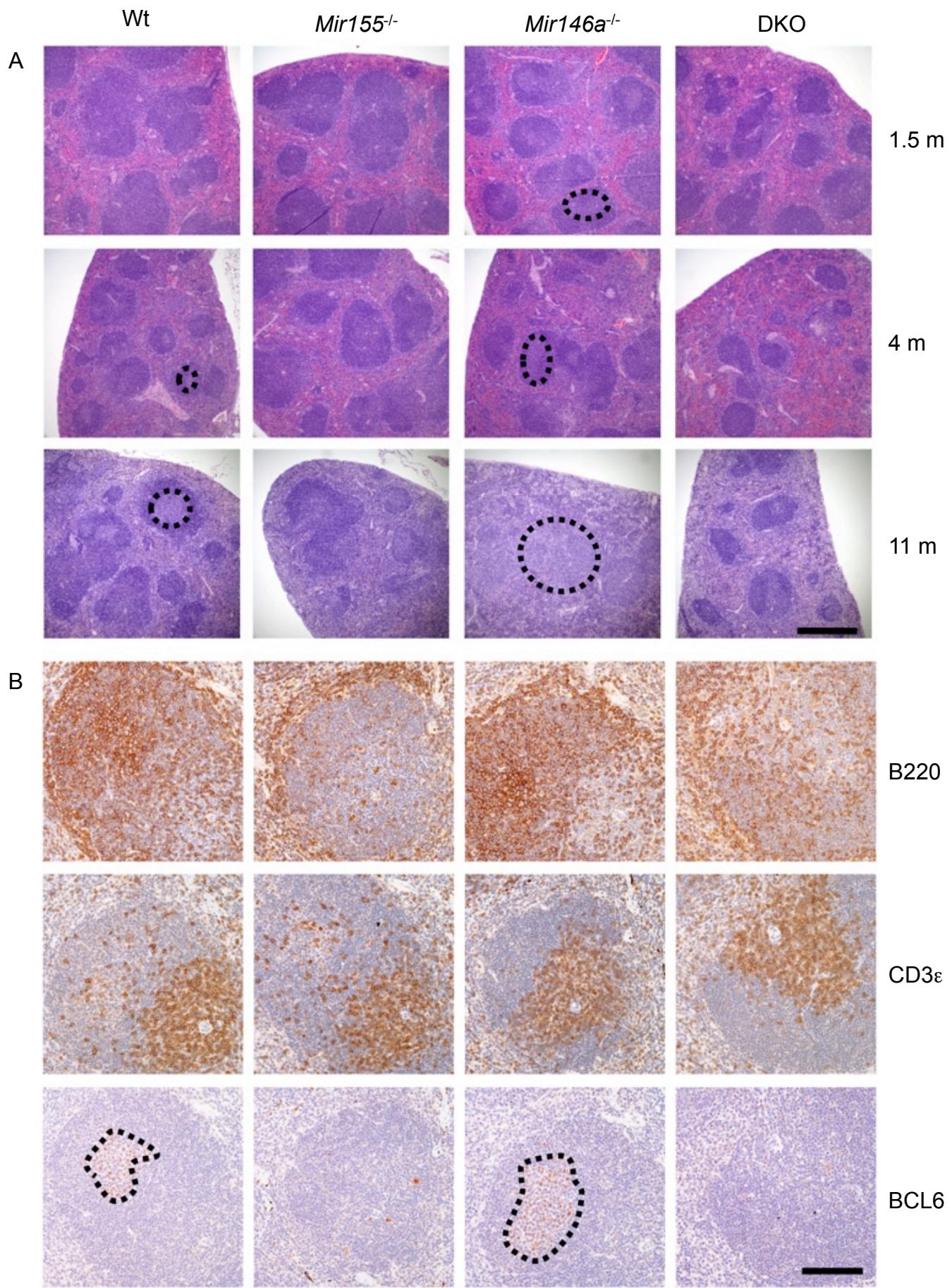
**Figure S1, related to Figure 1. miR-155 is required for activated T cell expansion in *Mir146a*<sup>-/-</sup> mice. (A-B)** Number of activated (CD69<sup>+</sup>CD62L<sup>lo</sup>) or naïve (CD69-CD62L<sup>hi</sup>) CD4<sup>+</sup> T cells in spleens from young and middle-aged mice. **(C)** Measured spleen weights at time of necropsy (10 months) following BM reconstitution with the indicated genotypes. **(D)** The ratio of CD45.2 (Wt or experimental BM) to CD45.1 (Wt control BM) WBCs in the peripheral blood of reconstituted mice were measured via flow cytometry at 0, 2, 4, 7, and 9 months of age. **(E)** CD45.2/CD45.1 ratio of activated CD4<sup>+</sup> T cells (CD62L<sup>-</sup> and CD69<sup>+</sup>) in the spleens of 10-month old recipients. **(F-H)** Relative expression of mature miR-155 (F) and miR-146a in sorted B220<sup>+</sup> B cells (H), or miR-146a in sorted CD4<sup>+</sup> T cells (G), from the spleens of middle-aged mice.

**Figure S2, related to Figure 2**



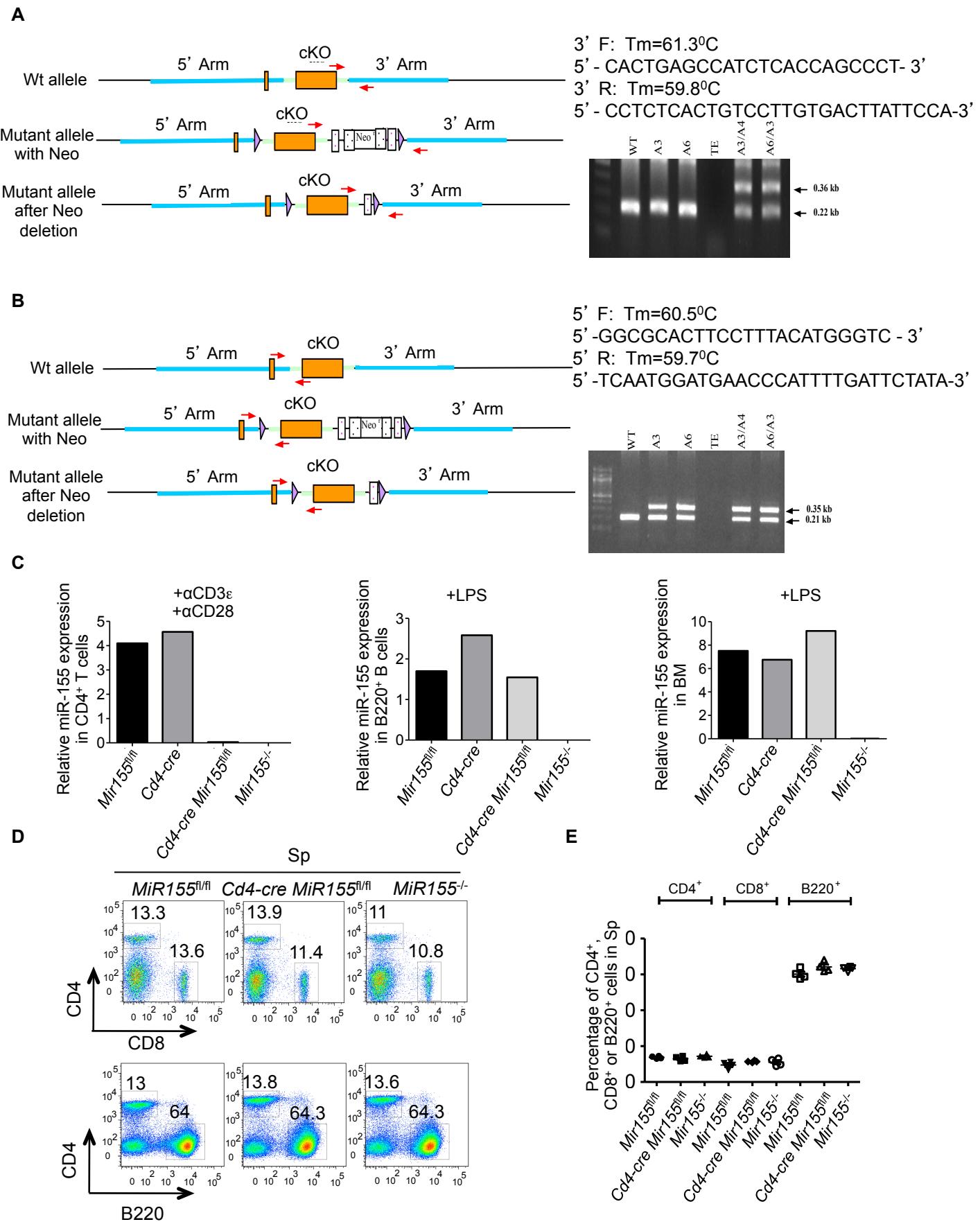
**Figure S2, related to Figure 2. Tfh and GC B cell populations in Wt, *Mir155*<sup>-/-</sup>, *Mir146a*<sup>-/-</sup> and DKO mice.** (A) Average percentage of Tfh, Th1 and Th17 cells in middle-aged mice of the indicated genotypes as assessed by intracellular staining. (B) Average percentage of PNA<sup>+</sup> GC B cells in middle-aged spleens. (C) Average total number of PNA<sup>+</sup> GC B cells in middle-aged spleens. (D) Average percentage of Tfh cells in middle-aged LNs. (E) Average percentage of PNA<sup>+</sup> GC B cells in middle-aged LNs. (F) Average percentage of CD44<sup>+</sup> Tfh cells in young mice. (G) Average percentage of CD44<sup>+</sup> Tfh in middle-aged mice.

**Figure S3, related to Figure 3**



**Figure S3, related to Figure 3. H&E staining and IHC of Wt, *Mir155*<sup>-/-</sup>, *Mir146a*<sup>-/-</sup> and DKO mice.** (A) Representative H&E staining of spleen sections from mice at the indicated ages (m=months). Examples of regions with germinal centers are indicated with a broken line. Scale bar: 400 microns. (B) Representative staining with the indicated antibodies on spleen sections from 1.5 months old mice of the indicated genotypes. Examples of regions with BCL6 staining are highlighted. Scale bar: 100 microns.

**Figure S4, related to Figure 4**

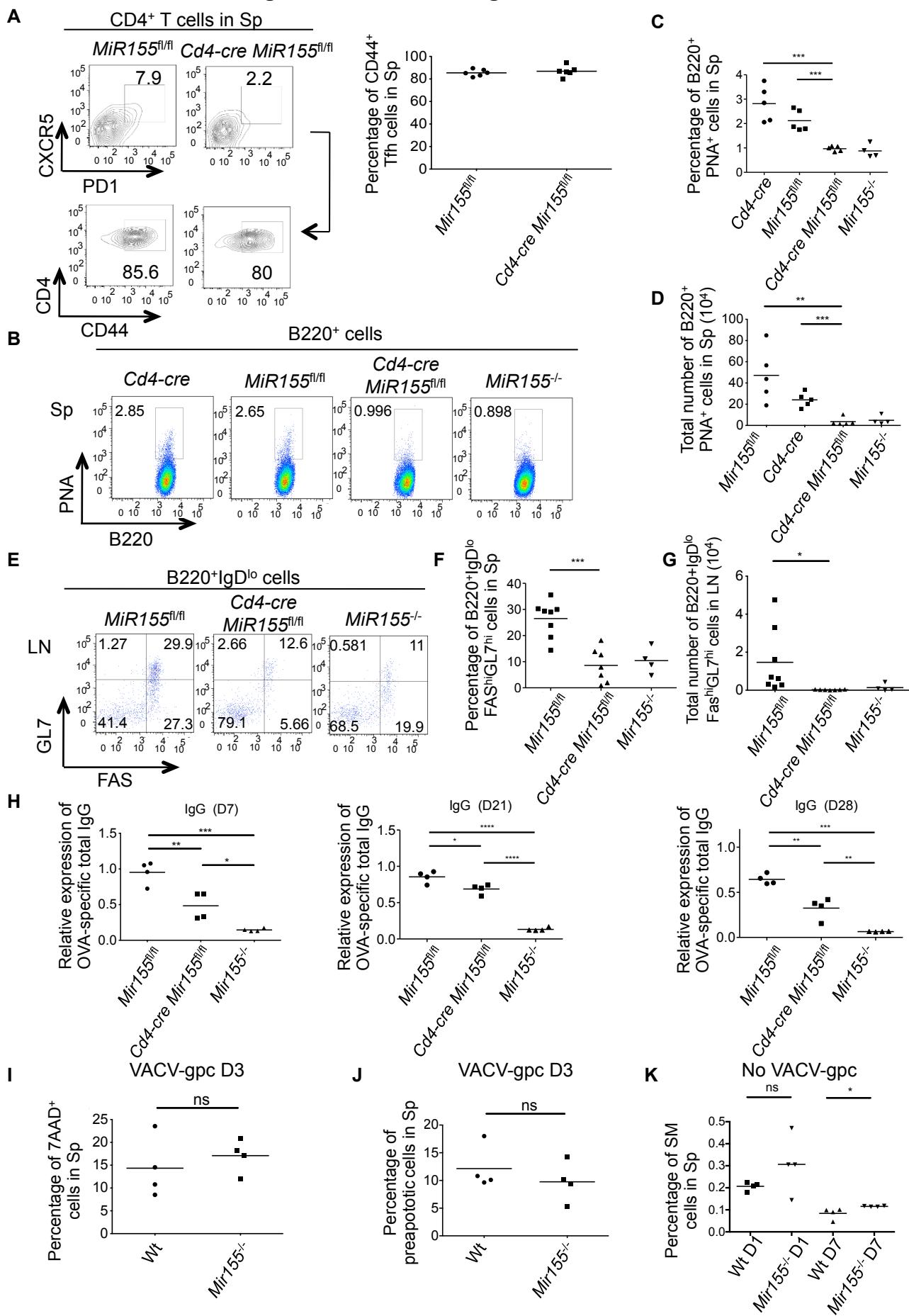


**Figure S4, related to Figure 4. Validation of ES cell clones with a “floxed” miR-155**

**(A)** Schematic of the floxed miR-155 allele and location of primers used to genotype the 3' loxP site. Primer sequences used for PCR and an agarose gel demonstrating Wt vs. Mutant alleles are shown. A3 and A6 are two independent ES cell clones before removal of Neo, while A3/A4 and A6/A3 are clones after removal of Neo.

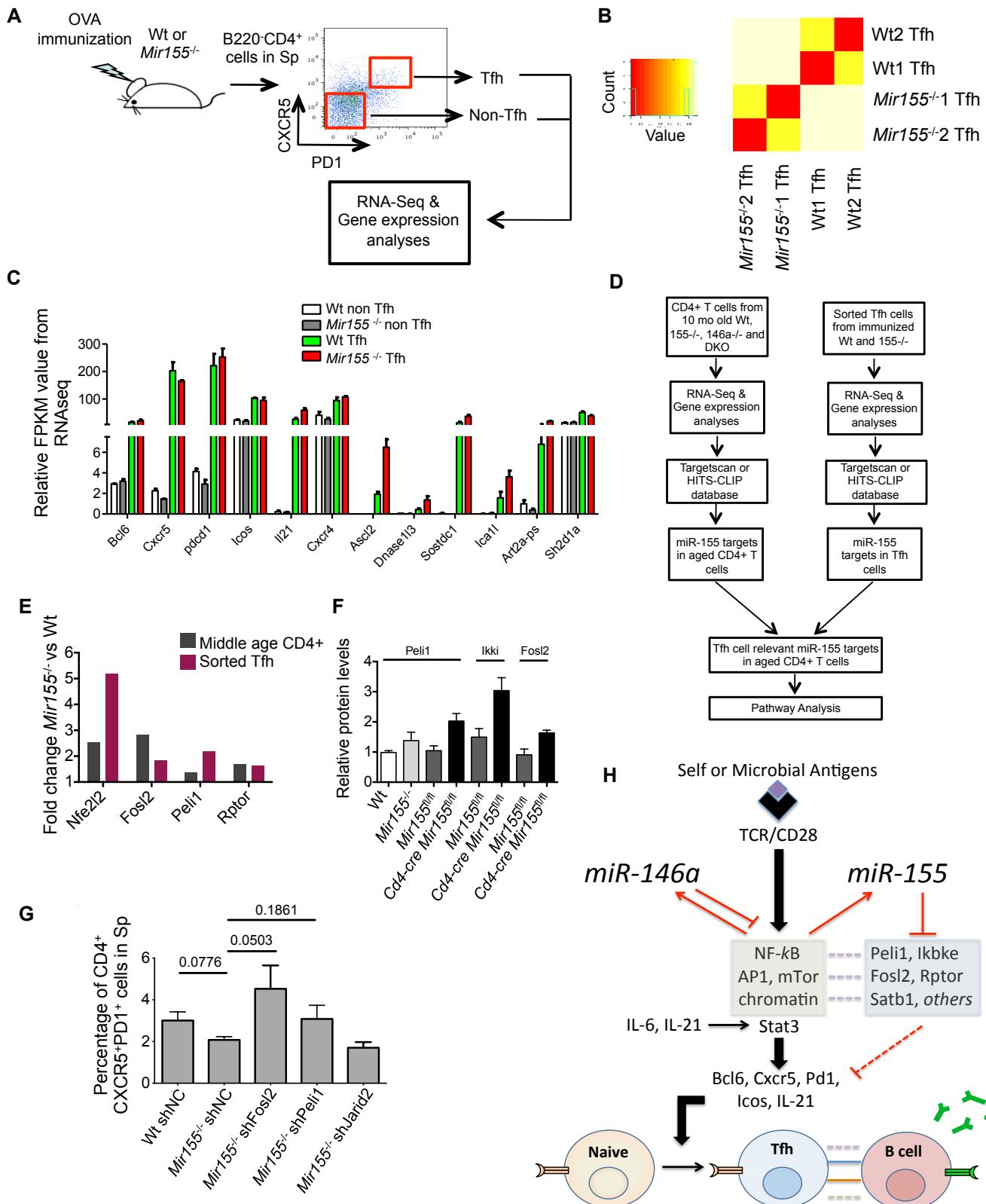
**(B)** Same as in (A) but using primers that flank the 5' loxP site. Primers that amplify the 5' loxP site were used for genotyping. **(C)** CD4<sup>+</sup> T, B220<sup>+</sup> B and bone marrow cells were isolated from the indicated mice and activated by anti-CD3ε+anti-CD28 antibodies or LPS, as indicated. 24 hrs later, RNAs were extracted and subjected to QPCR analyses to quantify mature miR-155 expression. Expression values have been normalized to 5S values. **(D)** FACS plots showing the percentage of CD4<sup>+</sup>, CD8<sup>+</sup> and B220<sup>+</sup> cells in indicated mouse spleens. **(E)** Average percentages of CD4<sup>+</sup>, CD8<sup>+</sup> and B220<sup>+</sup> cells in the indicated mouse spleens.

**Figure S5, related to Figure 4 and 5**



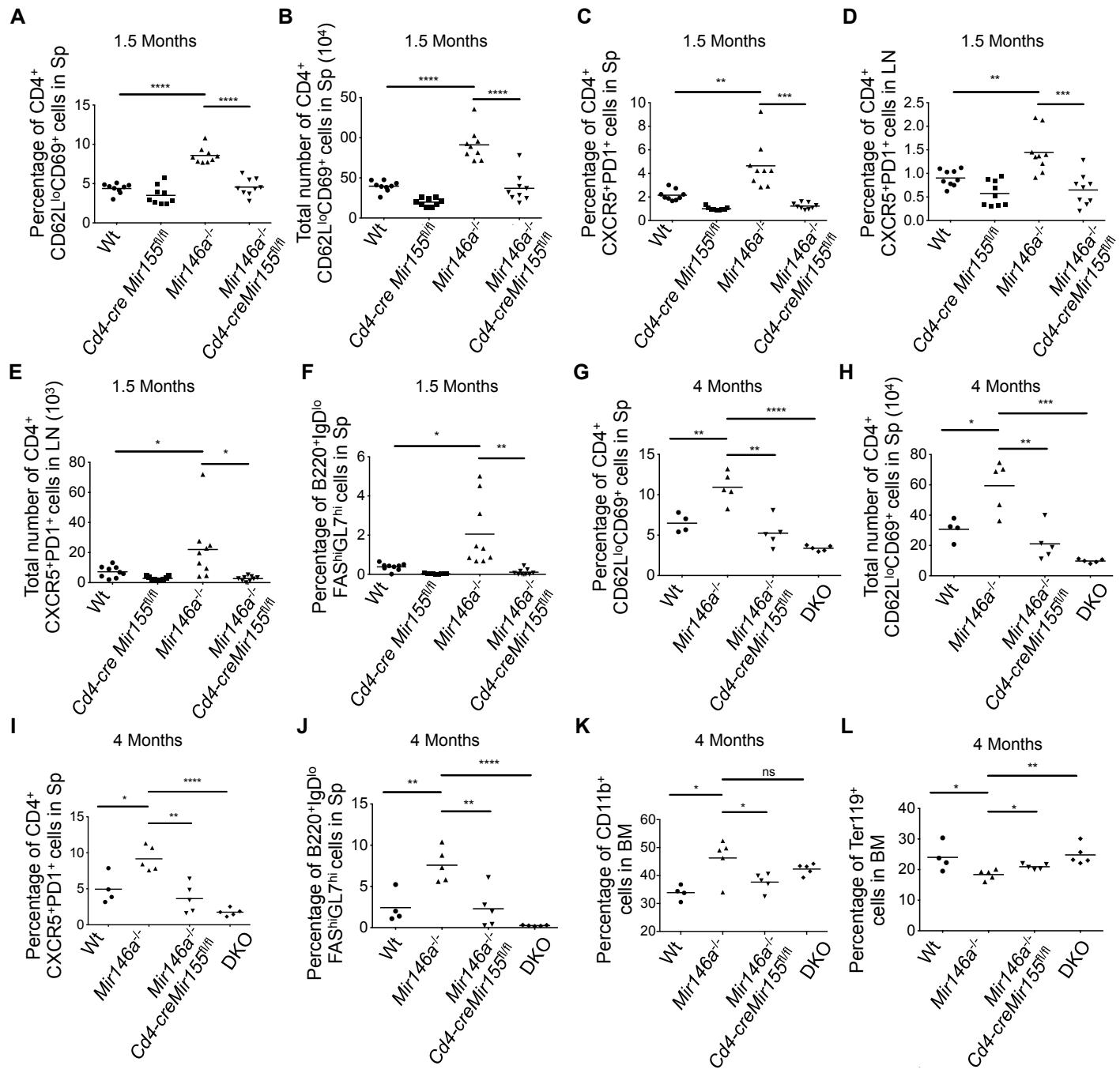
**Figure S5, related to Figures 4 and 5. T cell-intrinsic role for miR-155 during Tfh cell development.** (A-H) T cell-specific expression of miR-155 is required for proper antigen-specific responses by GC B cells. Mice were immunized with Ova in CFA for 8 days and then harvested. (A) FACS plots showing CD44 staining of Tfh cells from the indicated mouse spleens. Right panel shows the average percentage of CD44<sup>+</sup> cells among Tfh cells in mouse spleens. (B) FACS plots showing PNA staining of GC B cells in indicated mouse spleens. (C) Average percentage of PNA<sup>+</sup> cells in mouse spleens. (D) Average total number of PNA<sup>+</sup> cells in mice spleens. (E) FACS plots showing staining of GC B cells in LNs from the indicated genotypes. (F) Average percentage of GC B cells in mouse LNs. (G) Average total number of GC B cells in mouse LNs. (H) ELISA of relative concentrations of Ova-specific IgG antibody in the serum of Ova immunized mice from indicated time points. (I) Average percentage of Wt and *Mir155*<sup>-/-</sup> 7AAD<sup>+</sup>CD4<sup>+</sup> SM T cells in the indicated mouse spleens 3 days after VACV-gpc infection. (J) Average percentage of Wt and *Mir155*<sup>-/-</sup> AnnexinV<sup>+</sup>7AAD<sup>+</sup>CD4<sup>+</sup> SM T cells in the indicated mouse spleens 3 days after VACV-gpc infection. (K) Average percentage of SM cells in mouse spleens after adoptive transfer for the indicated periods of time.

**Figure S6, related to Figure 6**



**Figure S6, related to Figure 6. miR-155 targets in Tfh cells.** (A) Schematic diagram showing the sorting of Tfh cells from immunized Wt and *Mir155*<sup>-/-</sup> mice. RNAs were extracted from indicated cell populations and subjected to RNA-Seq. (B) Gene clustering of RNA-Seq data is shown. The magnitude of the gene expression differences between any two groups is indicated by color, and the scale is shown. (C) Relative Tfh signature gene expression in sorted CD4<sup>+</sup> Tfh cells from OVA immunized Wt and *Mir155*<sup>-/-</sup> mice based on RNA-Seq. (D) Schematic diagram of the approach used to identify Tfh cell-related miR-155 target genes in aged CD4<sup>+</sup> T cells. (E) QPCR analyses of the indicated miR-155 target genes in CD4<sup>+</sup> T cells from middle-aged Wt and *Mir155*<sup>-/-</sup> mice, or sorted CD4<sup>+</sup>CXCR5<sup>+</sup>PD1<sup>+</sup> Tfh cells from both Ova-immunized Wt and *Mir155*<sup>-/-</sup> mice. Data are presented as fold changes between *Mir155*<sup>-/-</sup> and Wt cells. (F) Relative protein expression in Wt and *Mir155*<sup>-/-</sup> or *Cd4-cre Mir155*<sup>f/f</sup> CD4<sup>+</sup> T cells, as indicated. (G) Average percentage of CXCR5<sup>+</sup>PD1<sup>+</sup> Tfh cells among CD3<sup>+</sup>CD4<sup>+</sup>TCRVβ11<sup>+</sup> cells in the spleens following adoptive transfer with the indicated shRNA-containing Wt or *Mir155*<sup>-/-</sup> 2D2<sup>+</sup> T cells and 7 days of immunization with MOG<sub>35-55</sub>. n=3-4 mice per group. (H) Schematic diagram showing the potential pathways regulated by miR-155 and miR-146a during Tfh development. Dashed gray line indicates regulation of the pathway that could be either quantitative (repression or activation) or qualitative (e.g. altered heterodimer complexes). Dashed red inhibition line indicates indirect inhibition.

**Figure S7, related to Figure 7**



**Figure S7, related to Figure 7. T cell-specific expression of miR-155 is required for activation of CD4<sup>+</sup> T cells and spontaneous accumulation of Tfh cells in *Mir146a*<sup>-/-</sup> mice.** (A-F) Spleens and LNs were harvested from 1.5 months old mice of the indicated genotypes. (A) Average percentage of CD62L<sup>lo</sup>CD69<sup>+</sup>CD4<sup>+</sup> T cells in spleens. (B) Total number of CD4<sup>+</sup>CD62L<sup>lo</sup>CD69<sup>+</sup> T cells in spleens. (C) Average percentage of Tfh cells in spleens. (D) Average percentage of Tfh cells in LNs. (E) Total number of Tfh cells in LNs. (F) Average percentage of GC B cells in spleens. (G-L) Spleens and bone marrow were harvested from 4 month old mice of the indicated genotypes. (G) Average percentage of CD62L<sup>lo</sup>CD69<sup>+</sup>CD4<sup>+</sup> T cells in spleens. (H) Total number of CD4<sup>+</sup>CD62L<sup>lo</sup>CD69<sup>+</sup> T cells in spleens. (I) Average percentage of Tfh cells in spleens. (J) Average percentage of GC B cells in spleens. (K) Average percentage of CD11b<sup>+</sup> cells in the BM. (L) Average percentage of Ter119<sup>+</sup> cells in the BM.

**Supplemental Table S1, related to Figure 4. Sequence of the Floxed mouse BIC allele (Homology arms in green, conditional knockout region in red. LoxP sites underlined. Frt sites in italics. Exons are bolded).**

1    GC GGCC CGCG TATGGACTTT GCCTTGTAAT TCAGAGCAAT CGCCTGTGTG TGTCCCACAC  
 61   AAATTAAGTT CTACAAAGACA AAAGCAAAATT CTCCTATCCT AGATCCAAAC ATAATTCTTA  
 121   TTAAATTCTA GATGGTCTGT TTTCGTTAA GAGGATAGGA TCTAGGATTG TATTAAGAAAT  
 181   CTACATCAA TCTTGCATAC CCAGAGCAT TGTCTATATA GGGAAAGAGGA AAAAATACAA  
 241   GATGTACTTA AGAACGTTAG GGTCTCGGT ACAGTATAATA CCCTTCCTT TTTTTATGTT  
 301   AGTGCTGTT ATCAGAGTGT TTGAAACATA TGGCAATAAC TAATAGCACA TACATTTCAA  
 361   TCACGACGAA TAGTCTCACAA AACTTTGTAT ACCGTTATTG ATTATCGTGT ATGTAAGGTT  
 421   TGGGGGAGTT TTATTAAGAT TAATTGTTGA CAAATAATAC GCGTGTACCT AAGTAGACAG  
 481   ACCCCCCCAA AATAATTATA ATAAACAACT GTTTTATTATG CGCACTAGGA TTCATCTGTC  
 541   AGGAAGTCA TGAGAAAGGTG ACCTTAAAGA GTGATGATAC TACAGAATTAA GTAAGTGC  
 601   TCCTTCAAGT ACTCTTCCAC TCGAATTCT CACTATG ATGTCTTAAT CATTGACGGT  
 661   TACATTCTCTT TTTCCCCAAA GATGAAAGGG AAAAATAGAG GTTATCAAAA AAATAAAAT  
 721   ATGTAAGGA AAAGGGGTTT CTACTTCCCT TTTTTATCTC CAATAGTTT TTTATTTTTA  
 781   TAAAAGAAGA AAAATCTTAC TTTTAAGAA AAATCTTATT AAAATCTTAC TGTTGTGGCA  
 841   ATTTTCTTCT TTTTAAATG AAAAATTCTT TTTAGAATAA TTTTAAATG ACAACACCGT  
 901   TTACAGAGTT TGCGCAGACA TGCGAAGACT TTGCGATAAT AGGAAATAAG AAGGACTAAA  
 961   AATGTCTCAA ACGGGCTGT ACGGTCTGA AACGTATTG TTCTTATTTC TTCTGTGATT  
 1021   GCAGTGGGCC TCATCTCATC AAAGCACTT CCCCCTCTGT CCCCTGTTT TCCTGTATG  
 1081   CGTCACCCGG AGTAGAGTAG TTACGTGAGA GGGGAGGACAA AGGGACAAAA AGGACAGTAC  
 1141   601 TTTTCCCCA TGTCTGTTT ATAGTGCCTT AGCAGAGCTT TGGGCCTGCA CTAAGCCCAT  
 1201   AAAAAGGGT ACAGACAAAG TATCACGGAA TCGTCTCGAA ACCCGGACGT GATTGGGTGA  
 1261   661 GAGGTCACTG AAGTAAGGAA GTTGGTTCCCT CCCTGTGATG CAGTGAAGTG GGGAGAAAGC  
 1321   CTCCAGTGAC TTCATTCTT CAACCAAGGA GGGACACTA GTCACTTCAC CCCTCTTTCG  
 1381   721 TGAACCTCAGG CTAGCTCCAC TCCACGTTAT CTGCTTGAC TCTCCACACC CAGACTCTGG  
 1441   781 ACTTGAGTCC GATCGAGGTG AGGTGCAATA GACGAACGTG AGAGGTGTGG GTCTGAGACC  
 1501   841 AGGGAAAGAT CCTAACCTGT TTTTCCACA TCCTTATCTG ATATTAATCA TAACCCATGA  
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 1741   1081 CTACAGAGA GTTATATAAA GGTTACTCA GGGTTATATC ATATCACGGT AAGAAGACTC  
 1801   1141 AAGATTCAA AGCATGCCGT ATTTTTTGC TTGCATGTAT TAATTCTTAA GGAAATTCTT  
 1861   1201 TTCTAAGTTT TCGTACGGCA TAAAAAAACG AACGTACATA ATAAAATAA CCTTAAAAAA  
 1921   1261 CATAATACAT AAGAGTATGT TGATATATAAG CTGTTCTGT TCCTTGTCGC TCCTTCAAT  
 1981   1321 GTATTATGTA TTCTCATACA ACATATATTTC GACAAGACAC AGGAACACCG AGGAAGTTA  
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 2401   1741 TGTCACCTGA TTCAGGAATAC AGATTATTAT CATAAAGCAA CTGTTTGTGTT TGTTTTAGAA  
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 3001   2341 1621 AAGAAGACTT ATTGATCTGT TAGAAGAGATGT CAGAAGCAGG TCACACAAA CATCTTCTC  
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10681 CCATTGGCTG AGAGTTAGAA AACAAAGTTT TCCTGGTCTT CATGTGGGAC TTCTAACACT  
GGTAACCGAC TCTCAATCTT TTGTTCAAAA AGGACAGAAA GTACACCCCTG AAGATTGTCA  
10741 GAGAGCAGGG GCTGCCCTG ACTGTTGCCT GCCTGTGGGA CCCTTCAGG CTGCCCTAATG  
CTCTGTCCC CGACGGAGAC TGACAACCGA CGGACACCCCTT GGGAAAGTCC GACGGATTAC  
10801 GGCTGCCTG TCTAGCCTCA ACAGAGAGAAG ATGTGCCTAG CCTTAACACTGC AACTTTTAT  
CCGACGGAAC AGATCGGAGT TGCTCTCTTC TACACGGATC GGAATTGACG TTGAAAATA  
10861 GCTAGGGCTG GTTGATATCC ATGGGAGGCC TCCCCTTTC TGAAGAGAAA CAGAGTGGAT  
CGATCCCGAC CAACTATAGG TACCCCTCCG AGGGGAAAG ACTTCTCTTT GTCTCACCTA  
10921 GAGGTGGGAG AAAGGACTGG GAGGAGAGGA AGTTCTAGT GGGATGTATA AGTAATTAGA  
CTTCCACCCCTC TTCTCGACC CTCCCTCTCT TCAAGATCAG CCCTACATAT TCATTAATCT  
10981 AAAAGATTTT TTGTAAGAAA ACTAACTAGG AAATAATTAG AAAAGGAAAC CCAGCTTTTC  
TTTCTAAAA AACATTCTT TGATTGATCC TTATTAATC TTTCCCTTG GGTGAAAG  
11041 TTGCTCGCTC TCATCAGCTA ATAACACCTA GTAGCAGAGG TAGGACAGGA GAGAAAGCTG  
AACGAGCGAG AGTAGTCGAT TTATTTGGAT CATCGTCTCC ATCCTGTCTT CTCTTCGAC  
11101 GGACAGACTG AGGCACACAT AGAAACTGTG GCATAACAGT CATTCTCTGA GAATAATGG  
CCTGTCTGAC TCCGTGTGTA TCTTGACAC CGTATTGTCA GTAAAGGACT CTTATTAC  
11161 TCAGGGCATG AAAGAATGGG GAAACTTGAA GTAAATACAGA AGTGGGAAAA ACACCGAAC  
AGTCCCGTAC TTTCTTACCC CTTGAACCTT CATTATATG TCACCCCTTT TGTGCGCTT  
11221 GAAGGAAATT AAATAAAATAC AGCTAAATAT TCCTAAAGTGA GCAGACCCAC TAAGGACCAA  
CTTCCTTAA TTTATTTATG TCGAGTTTTA AGGATTCACT CGTCTGGGT ATTCTGGTT  
11281 GAGACGGCA CAGCTACAGA ATGTCAGAAT CCCGTAACAA CAAAGCAAG GTCCCACAAAG  
CTCTGGCGT GTCGATGTC TACAGTCTTA GGGCATTGTT GTTTCGTTC CAGGGTGTTC  
11341 TGTCACAC AGAGCTTCAG TGTAAACATCA GACAAGAAC AGGCTGTCAG TCTTGTCA  
ACAGGTCGTC TCTCGAAGTC CAATTAGT CTGTTCTTGG TCCGACAGTC AGAACAGTC  
11401 ATTGTCACTT GCCAGAAGCC AACTGGGCTC TTCTGAGTC CTGATAGGAA ACTGTTTCA  
TAACAGTGA CGGTCTTCGG TTGACCCGAG AAAGACTCA GACTATCCTT TGACAAAAGT  
11461 AAATAGAATT CCGTATCTAG TCAAACAGCT GCTCAAAGCC AGCACAGCTA AAAGCCGGT  
TTTATCTTAA GGCAAGATC AGTTGTCGA CGAGTTTCGG TCGTGTGAT TTTCCGCCAC  
11521 TAGGCACCCA GTTACCTTG CCTTACGGAT TTCCCTCTAG GAAGGCACTG GGGAACACGCT  
ATCCGTTGGT CAAGTGGAAC GGAATGCTA AAAGGGGATC CTTCGTCAC CCCTGTCGA  
11581 CTAGGGATG AGAGCCGGGC CTAGTGAATT TCGGTATATG ATATTTTAT TTACAACATT  
GATCCCTTAC TCTCGGCCG GTCACCTTAA AGCCATATAC TATAAAATA AATGGTAA  
11641 TTCATAATAA TGTTTATTAC ATATGTGTAT ATATATACAC ACACACACAT ATATATATAC  
AAGTATTATT ACAAAATAATG TATACACATA TATATATGTG TGTGTGTGTA TATATATATG  
11701 ATATATATAT ACATACATAT ATATATACAC ACACACACAC ACACACATAT ATATATATAT  
TATATATATA TGTATGTATA TATATATGTG TGTGTGTG TGTGTGTATA TATATATATA  
11761 ATATATATAAC TAAAAGAGA AAACATGTT TGGAGGCTAG CATCTGCTAG CATCTAACAG  
TATATATTAG ATTTTCTCT TTGATCAAAC ACCTCCGATC GTAGACCATC GTAGATTGTC  
11821 AACTCCGCTA CCAGAATGCA AACTTATCCA GGATTCCTG CGGGCGGAG CACCTGTGAG  
TTGAGGGCGAT GGTCTTACGT TTGAATAGGT CCATAGGGAC GCCCGCCGTC GTGGACACTC  
11881 AGTAGAGCAG CCTGGTAAG ATCACCTGCA CTCTCTATGG TGATGAAACA GAAACACTGT  
TCATCTCGTC GGAACCATT TAGTGGACGT GAGAGATACC ACTACTTGT CTTTGTACA  
11941 CTTAACAACTT GGGAAATTAAA TAAGATGCTC ACACCCCTAA TCTAGGACTT GGAAGGCA  
GAATTGTTCA CCCTTAATTG ATTCCTACAG TGTGGGATTA AGATCCTGAA CCTTCCGCT  
12001 GGCAGGGGG CGTCATAGCC AGTCCAGAC CAGGTTAAC TACACACTGA GACGCTGGCT  
CCGCTCTCCC GACGTATCGG TCAAGGTCTG GTCCAAATTG ATGTGTGACT CTCGGACCGA  
12061 CAAATAAAAC AACAGAGAAC CTCCGGGGAG GGAGGGGCCT AGGGGTGCTT AACACACTGG  
GTTTATTGGT TTGCTCTTC GAGGCCCTC CCTCCCCGGGAA TCCCCACGAA TTGTTGAC  
12121 CACATAGTAG CGACACAGTT AACAGCATCG CCCATCTGCA AACACATTAT TTCGAACATG  
GTGTATCATC GCTGTGTCAA TTGTCGTAGC GGGTAGACGT TTGTTGATAA AAGCTTGAC  
12181 GATGTTTACT AGAGCACTT TAAACAGCC CAAACTGGCG CACACACAGT GTATTTTCCC  
CTACAAATGA TCTCGTGAGA AATTGTCGG GTTGTACCGC GTGTGTGTC CATAAAAGGG  
12241 ATGTGTCTT CCATGGGGAG GAGGCGCATG GACCTCCTTA AAGTGTGTTAT CTGCAAGAGCA  
TACACAGATA GGTACCCCTC CTCCGCGTAC CTGGAGGAAT TTCAGACATA GACGCTCGT  
12301 GGGACAAACA CACATTGTAT TAAAGCTTT TATTTTAATT TACTCTACAA GTTTAAATT  
CCCTGTTGT GTGTAACATA ATTTGCAAA ATAAAATTAA ATGAGATGTT CAAATTAA  
12361 TAGAACACTA CTGGGTGGAT TCGGTGTCT CTGTCGTCT GACTTCATCT TCAGTTACCT  
ATCTTGTGAT GACCCACCTA AGCCACAAAGA GACAGACAGA CTGAAGTAGA AGTCAATGGA  
12421 GTGAAGACAG CAACAGTTT ACTCCTCCGG CTCTTCTAGG CCACCCCTGTG CACAGTTCAA  
CACTCTGTC GTTGTCAAA TGAGGAGGCC GAGAAAGTCG GGTGGGACAC GTGTCAGTT  
12481 CCCCCACTCC CCCTCCTGTG AAACACCTGTC CCACCTCCTT CAGGAATTAT CACAGAGTT  
GGGGGTGAGG GGGAGGGACAC TTCTGGACAG GGTGAAGGAA GTCTTAATA GTGTCTCAA  
12541 AACAAACAA ACAAAAGTTC CGATATAAAC CACCAAGTGT GGCCATTAAA AACTATATAA  
TTGTTGTTGT TTTGTTCAAG GCTATATTG GTGGTTCACA CCGGTAATT TTGATATATT

12601 CAGAAGGCAT ATTAACGTAG GCTTCCTAAG TTTCTCACCT TATTCTTATC TATAAAACAA  
12661 GTCTTCGTA TAATTCATC CGAAGGATTG AAAGAGTGG AATAAGAATAG ATATTTGTT  
12721 AAGCATTACT ATGAGAAAAT TAGCAGGAGG GAAACACAGG GTATTCTCA TCAATGTGTC  
12781 TTCGTAATGA TACTCTTTA ATCGTCCTCC GCGCCTAGTT ATTAATAGTA ATCAATTACG  
12841 AATGACGCCA GCGCTGCGCA CGATCGGGCC CGCGGATCAA TAATTATCAT TAGTTAATGC  
12901 GGGTCATTAG TTCATAGCCC ATATATGGAG TTCCGCGTTA CATAACTTAC GGTAAATGGC  
12961 CCCAGTAATC AAGTATCGG TTATACATTC AAGGCAGCTA GTATTGAATG CCATTTACCG  
13021 CGGCCTGGCT GACGCCCAA CGACCCCCGC CCATTGACGT CAATAATGAC GTATGTTCCC  
13081 GGCAGGCCGA CTGGGGGGTG GCTGGGGGCG GTAAACTGCA GTTATTACTG CATACAAGGG  
13141 ATAGTAACG CAAATAGGGAC TTTCATTGAG CGTCAATGGG TGGAGTATT ACGGTAAACT  
13201 TATCATTGCG GTTATCCCTG AAAGGTAACT GCAGTTACCC ACCTCATAAA TGCCATTG  
13261 GCCCACTTGG CAGTACATCA AGTGTATCAT ATGCCAAGTA CGCCCCCTAT TGACGTCAAT  
13321 CGGGTGAACC GTCATGTAGT TCACATAGTA TACGGTTCAT GCGGGGGATA ACTGCAGTTA  
13381 GACGGTAAT GGCGCGCTG GCATTATGCC CAGTACATGA CCTTATGGGA CTTTCTACT  
13441 CTGGCATTAG CGGGCGGGC CGTAATACGG GTCATGTACT GGAATACCC GAAAGGATGA  
13501 TGGCAGTACA TCTACGTATT AGTCATCGCT ATTACCATGG TCGAGGTGAG CCCCACGTT  
13561 ACCGTCAATG AGATGCATAA TCAGTAGCGA TAATGGTACCG AGCTCACTC GGGGTGCAAG  
13621 TGCTTCACTC TCCCCATCTC CCCCCCTCTCC CCACCCCCAA TTTGTATT ATTATTTTT  
13681 ACGAAGTGAG AGGGGTAGAG GGGGGGGAGG GGTGGGGGTT AAAACATAAA TAAATAAAA  
13741 TAATTATTT GTGCAGCGAT GGGGGCGGGG GGGGGGGGGG GGCGCGCGCC AGGCGGGCG  
13801 ATTAATAAAA CACGTGCTA CCCCCGCC CCCCCCCCCC CCGCGCGCGG TCCGCCCCCGC  
13861 GGGCGGGCG AGGGGGCGGG CGGGCGAGG CGGAGAGGT CGGGCGCAGC CAATCAGAGC  
13921 CCCGCCCCGC TCCCCGCC CCCCCGCTCC GCCTCTCCAC GCGCCGGTGC GTTACGTCTCG  
13981 GGCAGCGCTC GAAAGTTTCC TTTTATGGCG AGGCAGCGGC GGCAGCGGGC CTATAAAAAG  
14041 CCGCGCGAGG CTTCAAAGG AAAATACCGC TCCGCGCCG CCGCCGCCGG GATATTTTC  
14101 CGAAGCGCGC GGCAGGGCGGC TGGCACCTGC AGGTCTCGC CATGGACCCCT GATGATGTTG  
14161 GCTTCGCGCG CCGCCCGCCG ACGGCTGGACG TCCAGGAGCG GTACCTGGGA CTACTACAAAC  
14221 TTGATTCTTC TAAATCTTT GTGATGGAAA ACTTTCTTC GTACCACGGG ACTAAACCTG  
14281 AACTAAGAAG ATTTAGAAAA CACTACCTT TGAAAAGAA CATGGTGGCCC TGATTTGGAC  
14341 13501 GTTATGTAGA TTCCATTCAA AAGGTATAC AAAAGCCTAA ATCTGGTACA CAAGGAAATT  
14401 CAATACATCT AAGGTAAAGT TTTCATATG TTTCTGGTT TAGACCATGT GTTCTTTAA  
14461 13561 ATGACGATGA TTGAAAGGG TTTTATAGTA CCGACAATAA ATACGACGCT GCGGGGAAACT  
14521 TACTGCTACT AACCTTTCCC AAAATATCAT GGCTGTTATT TATGCTGCGA CGCCCTATGA  
14581 13621 CTGTAGATAA TGAAAACCCG CTCTCTGGA AAGCTGGAGG CGTGGTCAA GTGACGTATC  
14641 GACATCTATT ACTTTGGC GAGAGACCTT TTGACCTCC GCACCAAGTTT CACTGCATAG  
14701 13681 CAGGACTGAC GAAGGTTCTC GCACCTAAAG TGGATAATGC CGAACACTATT AAGAAAGAGT  
14761 13741 GTCCTGACT CTTCCAAGAG CGTGTATTTC ACCTATTACG GCTTGATAA TTCTTCTCA  
14821 TAGGTTAAAG TCTCACTGAA CGCTTGATGG AGCAAGTCGG AACGGAAGAG TTTATCAAA  
14881 13801 ATCCAATTG AGAGTGACTT GGCACACTACC TCAGTCAGCC TTGCTTCTC AAATAGTTT  
14941 13861 GGTTCGGTGA TGGTGCCTCG CGTGTAGTGC TCAGCCTTCC CTCGCTGAG GGGAGTTCTA  
15001 13921 CCAAGCCACT ACCACGAAGC GCACATCACG AGTCGGAAGG GAAGCGACTC CCCTCAAGAT  
15061 13981 GCGTTGAATA TATTAATAAC TGGGAACAGG CGAAAGCGTT AAGCGTAGAA CTTGAGATTA  
15121 CGCAACTTAT ATAATTATTG ACCCTTGTC GCTTTGCCA TTGCGCATTT GAACCTAAT  
15181 14041 ATTTGAAAC CGCTGGAAAA CGTGGCCAAG ATGCGATGTA TGAGTATATG GCTCAAGCCT  
15241 TAAAACCTTG GGACCACTTT GCACCGGGTC TACGCTACAT ACTCATATAC CGAGTTCGGA  
15301 14101 GTGCAGGAAA TCGTGTCAAGG CGATCTCTT GTGAAGGAAA CCTTACTTCT GTGGTGTGAC  
15361 14161 CACGTCCTT AGCACAGTCC GCTAGAGAAA CACTTCCTT GGAATGAAGA CACCACACTG  
15421 14221 ATAATTGGAC AAACTACCTA CAGAGATTAA AAGCTCTAA GTAAATATAA AATTTTAAAG  
15481 14281 TATTAACCTG TTTGATGGAT GTCTCAATAT TTGAGGATCT CATTATATT TTAAAAAATT  
15541 14341 TGTATAATGT GTTAAACTCT TGATTCTAAAT TTGTTGTGT ATTTTAGATT CCAACCTATG  
15601 14401 ACATATTACA CAATTGTATG ACTAAGGATT AACAAACACA TAAAATCTAA GTTGGATAAC  
15661 14461 GAACTGATGA ATGGGAGCAG TGGTGGATG CAGATCCACT AGGATCTAAC TTGTTTATTG  
15721 14521 CTTGACTACT TACCCCTCGTC ACCACCTTAC GTCTAGGTGA TCCTAGATT AACAAATAAC  
15781 14581 CAGCTTATAA TGGTACAAA TAAAGCAATA GCATCACAAA TTTCACAAAT AAAGCATTTT  
15841 14641 GTCGAATATT ACCAATGTTT ATTTCGTTAT CGTAGTGTGTT AAAGTGTGTT TTTCGTAAA  
15901 14701 TTTCACTGCA TTCTAGTTGT GGGTTGTCCA AACTCATCAA TGTATCTTAT CATGCTGGA  
15961 14761 AAAGTGACGT AAGATCAACA CCAAACAGCT TTGAGTACT ACATAGAATA GTACAGACCT  
16021 14821 TCGTAGTCTC AGAGCGGACC GAGGGGGCCC GTACTACGCC TTAAGTGAATG CGTATTACGG  
16081 14881 AGCATCAAGA TCTCGCCTGG CTCCCCCGGG CATGATCGGG AATTCACTCA GCATAATGCC  
16141 14941 ACTGGCCGTC GTTTTACAAC GTCTGTACTG GGAAAACCCG GGCAGTTACCC AACTTAATCG  
16201 15001 TGACCGCGAG CAAAATGTT CAGCACTGAC CCTTTGGGA CCGCAATGGG TTGAATTAGC  
16261 15061 CCTTGCGAGCA CATCCCCCTT TCGCCAGCTG GCGTAATAGC GAAGAGGCC GCACCGATCG  
16321 15121 GGAACGTCGT GTAGGGGAA AGCGGTGAC CGCATTATCG CTTCTCCGGG CGTGGCTAGC  
16381 15181 CCCTTCCCAA CAGTTGCGCA GCCTGAATGG CGAATGGCGC TTCGCTTGGT AATAAAGGCC  
16441 15241 GGGAGGGTT GTCAACGCGT CGGACTTACC GCTTACCGCG AAGCGAACCA TTATTCGGG  
16501 15301 GCTTCGGCGG GCTTTTTTT GTAACTACTG TCAGGTGGCA CTTTCCGGG AAATGTGCGC  
16561 15361 CGAAGCCGCC CGAAAAAAAG CAATTGTATG AGTCCACCGT GAAAAGCCC TTTACACGCG  
16621 15421 GGAACCCCTA TTTGTTATT TTTCTAAATA CATTCAAATA TGTATCCGCT CATGAGACAA  
16681 15481 CCTTGGGGAT AAACAAATAA AAAGATTAT GTAAGTTAT ACATAGGCAGA GTACTCTGTT  
16741 15541 TAACCCCTGAT AAATGCTTCA ATAATATTGA AAAAGGAAGA GTATGAGTAT TCAACATTTC

ATTGGGACTA TTTACGAAGT TATTATAACT TTTTCCTTCT CATACTCAT AAGTGTAAAG  
14761 CGTGTGCCCT TTATTCCTT TTTGCGGCA TTTGCCTC CTGTTTTGC TCACCCAGAA  
GCACAGCGGG AATAAGGGAA AAAACGCCGT AAAACGGAAG GACAAAAAACG AGTGGGTCTT  
14821 ACGCTGGTGA AAGTAAAAGA TGCTGAAGAT CAGTTGGGTG CACGAGTGGG TTACATCGAA  
TGCGACCACT TTCATTTCT ACGACTTCTA GTCAACCCAC GTGCTCACCC AATGTAGCTT  
14881 CTGGATCTCA ACAGCGGTAA GATCCTTGAG AGTTTCGCC CCGAAGAACG TTCTCCAATG  
GACCTAGAGT TGTGCCATT CTAGGAACCTC TCAAAAGCGG GGCTTCTTGC AAGAGGTTAC  
14941 ATGAGCACTT TTAAGTCTC GCTATGTGGC GCGGTATTAT CCCGTGTTGA CGCCGGGCAA  
TACTCGTGA AATTCAAGA CGATACACCG CGCCATAATA GGGCACAACG GCGGGCCGTT  
15001 GAGCAACTCG GTCGCCGCAT ACACATTCT CAGAATGACT TGTTGAGTA CTCACCAGTC  
CTCGTTGAGC CAGCGCGTA TGTTGAGA GTCTTACTGA ACCAACTCAT GAGTGGTCAG  
15061 ACAGAAAAGC ATCTTACGGA TGGCATGACA GTAAGAGAAT TATGCAGTGC TGCCATAACC  
TGTCTTTCG TAGAATGCCT ACCGTACTGT CATTCTCTTA ATACGTACG ACGGTATTGG  
15121 ATGAGTGATA ACACTGCGGC CAACTTACTT CTGACAAACG TCGGAGGACC GAAGGAGCTA  
TACTCACTAT TGTGACGGG GTTGAATGAA GACTGTTGCT AGCCTCTGCG CTTCTCGAT  
15181 ACCGCTTTT TGCACACAT GGGGGCAT TGAACCTCGG TTGATCGTTG GGAACCGGAG  
TGGCGAAAAA ACCTGTTGTA CCCCTAGTA CATTGAGCGG AACTAGCAAC CCTTGGCCTC  
15241 CTGAATGAAG CCATACACAA CGACGAGCGT GACACCCAGA TGCTGTAGC AATGGCAACA  
GACTTACTTC GGTATGGTT GCTGCTCGCA CTGTTGTTGCT ACGGACATCG TTACCGTTGT  
15301 ACGTTGCGCA AACTATTAAAC TGGCGAACTA CTTACTCTAG CTTCCCCGCA ACAATTAAATA  
TGCAACCGGT TTGATAATTG ACCGCTTGAT GAATGAGATC GAAGGGCCGT TGTAAATTAT  
15361 GACTGGATGG AGGGCGATAA AGTTGAGGA CCACTCTGC GCTCGGCCCT TCCGGCTGGC  
CTGACCTACC TCCGCTATT TCAACGCTCT GGTGAAGACG CGAGCCGGGA AGGCCGACCG  
15421 TGGTTTATTG CTGATAAAC TGAGGCCGT GAGCGTGGGT CTCGCGGTAT CATTGAGCA  
ACCAAATAAC GACTATTAG ACCTCGGCCA CTCGCACCCA GAGGCCATA GAAACGTGCT  
15481 CTGGGGCCAG ATGGTAAGCC CTCCCGTATC GTAGTTATCT ACACGACGGG GAGTCAGGCA  
GACCCCGGTC TACCATTCCG GAGGGCATAG CATCAATAGA TGTGCTGCC CTCAGTCCGT  
15541 ACTATGGATG AACGAAATAG ACAGATCGCT GAGATAGGTG CCTCACTGAT TAAGCATTGG  
TGATACCTAC TTGCTTTATC TGCTAGCGA CTCTATCCAC GGAGTACTA ATTGTAACCC  
15601 TAACTGTCA ACCAAGTTA CTCCATATA CTTTAGATG ATTACCCCG GTTGAATAATC  
ATTGACATC TGTTCAAAAT GAGTATATAT GAAATCTAAC TAAATGGGGC CAACATTAG  
15661 AGAAAAGCCC CAAAACAGG AAAGATTGAT AAGCAAATAT TTAAATTGTA AACGTTAAATA  
TCTTTTCGGG GTTTTGTC TTCTAACATA TTGTTTATA AATTTAACAT TTGCAATTAT  
15721 TTTGTTAAA ATTCCGCTTA AATTTTGTT AAATCAGCTC ATTTTTAAC CAATAGGCCG  
AAAACAATT TAAGCGCAAT TAAAAAACAA TTAGTCGAG TAAAAAATTG GTTATCCGGC  
15781 AAATCGCAA AATCCCTTAT AAATCAAAAG AATAGCCCGA GATAGGGTTG AGTGGTGTTC  
TTTAGCCGTT TTAGGAAATA TTAGTTTCT TTATCGGGCT CTATCCCAAC TCACAACAAG  
15841 CAGTTGGAA CAAGAGTCCA CTATTAAGA ACCTGGACTC CAACGTCAA GGGCGAAAAAA  
GTCAAACCTT GTTCTCAGGT GATAATTCT TGACACTGAG GTTGCAGTTT CCCGTTTTT  
15901 CCGTCTATCA GGGCGATGGC CCAACTACGT AACCACCAAC CAAATCAAGT TTTTGGGT  
GGCAGATACT CCCGCTACCG GGTGATGCAC TTGGTAGTGG GTTGTAGTCA AAAAACCCCA  
15961 CGAGGTGCCG TAAAGCACTA AATCGGAACC CTAAAGGGAG CCCCCGATTT AGAGCTTGAC  
GCTCCACGGC ATTCTGTAT TTAGCCTTGG GATTTCCCTC GGGGGCTAAA TCTCGAACTG  
16021 GGGGAAACGG AACGTGGCGA GAAAGGAAAGG GAAGAACGGC AAAGGAGCGG GCGCTAGGGC  
CCCCCTTCGCG TTGCAACCGCT CTTCTCTTCC CTTCTTCGCT TTTCCTCGCC CGCGATCCCG  
16081 GCTGGCAAGT GTAGCGGTCA CGCTGCGCGT AACCCACCAAC CCCGCCGCGC TTAATGCGCC  
CGACCGTTCA CATGCCAGT GCGACGCGCA TTGGTAGTGG GGGCGGGCG AATTACCGCG  
16141 GCTACAGGGC GCGTAAAAGG ATCTAGGTGA AGATCCTTT TGATAATCTC ATGACCAAAA  
CGATGTCCCG CGCATTTC TAGATCCACT TCTAGGAAAA ACTATTAGAG TACTGGTTT  
16201 TCCCTTAACG TGAGTTTCTG TTCCACTGAG CGTCAGACCC CGTAGAAAG ATCAAAGGAT  
AGGGAATTGCA ACTCAAAAGC AAGGTGACTC GCAGTCTGGG GCATCTTTTC TAGTTCCCTA  
16261 CTTCTTGAGA TCCTTTTTT CTGCGCGTAA TCTGCTGCTT GCAAACAAAA AAACCAACCGC  
GAAGAACTCT AGGAAAAAA GACGCGCATT AGACGACGA CGTTGTTTT TTTGGTGGCG  
16321 TACCAGCGGT GGTTGTTG CCGGATCAAG AGCTACCAAC TCTTTTCCG AAGGTAACTG  
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16381 GCTTCAGCAG AGCGCAGATA CCAAATACTG TTCTTCTAGT GTAGCCGTAG TTAGGCCACC  
CGAAGTCGTC TCGCGTCTAT GGTTTATGAC AAGAAGATCA CATCGGCATC AATCCGGTGG  
16441 ACTTCAAGAA CTCTGTACCA CGCCCTACAT ACCTCGCTCT GCTAATCCCTG TTACCACTG  
TGAAGTTCTT GAGACATCGT CGGGGATGTA TGGAGCGAGA CGATTAGGAC AATGGTCACC  
16501 CTGCTGCCAG TGGCGATAAG TCGTGTCTTA CGGGGTTGGA CTCAAGACGA TAGTACCGG  
GACGACGGTC ACCGCTATTG AGCACAGAAT GGCCCAACCT GAGTTCTGCT ATCAATGGCC  
16561 ATAAGGCAGCA CGGGTCGGGC TGAACGGGGG GTTCGTGCAC ACAGCCACAGC TTGGAGCGAA  
TATTCCCGT CGCCAGCCCG ACTTGCCCCC CAAGCACGT TGTCGGTCA AACCTCGCTT  
16621 CGACCTACAC CGAACCTGAGA TACCTACAGC GTGAGCTATG AGAAAGCGCC ACGCTTCCCG  
GCTGGATGTG GCTTGACTCT ATGGATGTCG CACTCGATAC TCTTCCGGG TGCGAAGGGC  
16681 AAGGGAGAAA GGCGGACAGG TATCCGGTAA CGGGCGAGGGT CGGAACAGGA GAGCCACGA  
TTCCCTTTT CCGCCTGTCC ATAGGCCATT CGCCGTCCA GCCTGTCTT CTCGCGTGT  
16741 GGGAGCTTCC AGGGGGAAAC GCCTGGTATC TTATAGTCC TGTCGGTTT CGCACCTCT  
CCCTCGAAGG TCCCCCTTG CGGACCATAG AAATATCAGG ACAGCCAAA GCGGTGGAGA  
16801 GACTTGAGCG TCGATTTTG TGATGCTCGT CAGGGGGCG GAGCCTATGG AAAAACGCCA  
CTGAACCTCGC AGCTAAAAC ACTACGAGCA GTCCCCCCGC CTCGGATACC TTTTGCGGT

16861 GCAACGCGGC CTTTTTACGG TTCTGGCCT TTTGCTGCC TTTGCTCAC ATGTAATGTG  
CGTTGCGCCG GAAAAATGCC AAGGACCGGA AAACGACCGG AAAACGAGTG TACATTACAC  
16921 AGTTAGCTCA CTCATTAGGC ACCCCAGGCT TTACACTTTA TGCTTCCGGC TCGTATGTTG  
TCAATCGAGT GAGTAATCCG TGGGGTCCGA AATGTAAAT ACGAAGGCCG AGCATACAAC  
16981 TGTGGAATTG TGAGCGGATA ACAATTCAC ACAGGAAACA GCTATGACCA TGATTACGCC  
ACACCTTAAC ACTCGCCTAT TGTAAAGTG TGTCTTTGT CGATACTGGT ACTAATGCGG  
17041 AAGCTACGTA ATACGACTCA CTAG  
TTCGATGCAT TATGCTGAGT GATC

**Supplemental Table S2, related to Figure 6. miR-155 targets in Tfh cells.**

GeneID	GeneName	Fold (KO Tfh/Wt Tfh)
ENSMUSG00000022687	Boc	4.132471013
ENSMUSG00000020303	Stc2	3.56824407
ENSMUSG00000020607	Fam84a	2.901785139
ENSMUSG00000024673	Ms4a1	2.84088474
ENSMUSG0000000266	Mid2	2.48974778
ENSMUSG00000016239	Lonrf3	2.442990071
ENSMUSG00000033855	Ston1	2.427239553
ENSMUSG00000035678	Tnfsf9	2.18540581
ENSMUSG00000052062	Pard3b	1.901509966
ENSMUSG00000029135	Fosl2	1.834219505
ENSMUSG00000025231	Sufu	1.714252053
ENSMUSG00000053477	Tcf4	1.631977424
ENSMUSG00000031342	Gpm6b	1.624162789
ENSMUSG00000038518	Jarid2	1.595074557
ENSMUSG00000036986	Pml	1.584578904
ENSMUSG00000027394	Ttl	1.569198575
ENSMUSG00000031642	Sh3rf1	1.540609963
ENSMUSG00000030557	Mef2a	1.539563208
ENSMUSG00000036959	Bcorl1	1.533549708
ENSMUSG00000059005	Hnrnpa3	1.531220914
ENSMUSG00000022272	Myo10	1.524470528
ENSMUSG00000020716	Nfl	1.518882534
ENSMUSG00000022462	Slc38a2	1.515038651
ENSMUSG00000052155	Acvr2a	1.494249438
ENSMUSG00000022698	Naa50	1.494238873
ENSMUSG00000030265	Kras	1.485442849
ENSMUSG00000048796	Cyb561d1	1.480012294
ENSMUSG00000038679	Trps1	1.476525682
ENSMUSG00000052707	Tnrc6a	1.46288146
ENSMUSG00000054693	Adam10	1.462129971
ENSMUSG00000020612	Prkar1a	1.455590762
ENSMUSG00000028945	Rheb	1.45360465
ENSMUSG00000020780	Srp68	1.444017874
ENSMUSG00000020849	Ywhae	1.442014059
ENSMUSG00000015839	Nfe2l2	1.436223028
ENSMUSG00000062866	Phactr2	1.433196872
ENSMUSG00000045730	Adrb2	1.425026996

ENSMUSG00000027522	Stx16	1.417934175
ENSMUSG00000021109	Hif1a	1.413589472
ENSMUSG00000026464	Zc3h11a	1.409026602
ENSMUSG00000020134	Peli1	1.390659016
ENSMUSG00000059474	Mbtd1	1.388926966
ENSMUSG00000042349	Ikbke	1.374892289
ENSMUSG00000005371	Fbxo11	1.367102012
ENSMUSG00000040848	Sft2d2	1.355026569
ENSMUSG00000025583	Rptor	1.354645351
ENSMUSG00000047879	Usp14	1.345762271
ENSMUSG00000032688	Malt1	1.345399894
ENSMUSG00000033209	Ttc28	1.343441062
ENSMUSG00000016534	Lamp2	1.332914831
ENSMUSG00000024143	Rhoq	1.332582239
ENSMUSG00000069895	Atxn11	1.331801472
ENSMUSG00000027189	Trim44	1.328798565
ENSMUSG00000033610	Pank1	1.325132572
ENSMUSG00000006527	Sfmbt1	1.323970264
ENSMUSG00000032216	Nedd4	1.321111964
ENSMUSG00000052302	Tbc1d30	1.320894342
ENSMUSG00000042390	Gata2b	1.320015875
ENSMUSG00000034560	A230046K03Rik	1.317313057
ENSMUSG00000048787	Dcun1d3	1.315573816
ENSMUSG00000005871	Apc	1.31373844
ENSMUSG00000063663	Brwd3	1.309838825
ENSMUSG00000031309	Rps6ka3	1.303179342
ENSMUSG00000027351	Spred1	1.300165448
ENSMUSG00000032846	Zswim6	1.298247907
ENSMUSG00000073725	Lmbrd1	1.288794784
ENSMUSG00000028403	Zdhhc21	1.283790153
ENSMUSG00000048118	Arid4a	1.282609173
ENSMUSG00000025626	Phf6	1.281033452
ENSMUSG00000023927	Satb1	1.280430032
ENSMUSG00000027523	Gnas	1.261838129
ENSMUSG00000042599	Kdm7a	1.258831269
ENSMUSG00000049470	Aff4	1.253888792
ENSMUSG00000021377	Dek	1.252301923
ENSMUSG00000004994	Ccdc130	1.250746955
ENSMUSG00000034247	Plekhm1	1.249459449
ENSMUSG00000024095	Hnrpll	1.246636795
ENSMUSG00000031016	Wee1	1.245243301

ENSMUSG00000029684	Wasl	1.245216518
ENSMUSG00000047888	Tnrc6b	1.24465774
ENSMUSG00000029004	Mll5	1.243020466
ENSMUSG00000021277	Traf3	1.238129802
ENSMUSG00000020918	Kat2a	1.233963072
ENSMUSG00000032413	Rasa2	1.228470829
ENSMUSG00000024969	Mark2	1.223552546
ENSMUSG00000022285	Ywhaz	1.22078065
ENSMUSG00000038342	Mlxip	1.220723661
ENSMUSG00000041528	Rnf123	1.217797469
ENSMUSG00000022663	Atg3	1.21660915
ENSMUSG00000029178	Klf3	1.212518534
ENSMUSG00000021488	Nsd1	1.212306842
ENSMUSG00000024241	Sos1	1.208561735
ENSMUSG00000037674	Rfx7	1.20590725

**Supplemental Table S3, related to Figure 6. miR-155 targets in CD4<sup>+</sup> T cells from middle aged mice.**

GeneID	GeneName	Fold(DKO/WT)	Fold(155KO/WT)	Fold(146KO/WT)
ENSMUSG00000022272	Myo10	2.331431916	2.455943208	1.040814644
ENSMUSG00000052040	Klf13	2.293345153	2.140585557	1.134085436
ENSMUSG00000023927	Satb1	1.753170089	2.119641237	-2.123911717
ENSMUSG00000056493	Foxk1	2.122844505	2.049143189	1.177268668
ENSMUSG00000047712	Ust	1.357459015	2.030804131	-2.009690169
ENSMUSG00000039087	Rreb1	1.990078721	2.003146727	1.00555831
ENSMUSG00000029135	Fosl2	1.810604192	1.938201454	1.163551873
ENSMUSG00000048796	Cyb561d1	1.6461751	1.806782568	1.183826453
ENSMUSG00000037896	Rcor1	1.616575625	1.734108057	1.063441255
ENSMUSG00000045730	Adrb2	1.476483874	1.733787336	-1.358271346
ENSMUSG00000020918	Kat2a	1.460721661	1.714166146	1.050074461
ENSMUSG00000018076	Med13l	1.736410739	1.707203809	-1.018280643
ENSMUSG00000041235	Chd7	1.402127263	1.683182605	-1.152584937
ENSMUSG00000029196	Tada2b	1.624537222	1.682953948	1.095369352
ENSMUSG00000035696	Rnf38	1.591433584	1.602117389	1.119839481
ENSMUSG00000020593	Lpin1	1.612429519	1.577333363	-1.106345796
ENSMUSG00000015839	Nfe2l2	1.210530643	1.575118642	-1.171658912
ENSMUSG00000042349	Ikbke	1.448399717	1.569226387	1.093022947
ENSMUSG00000025026	Add3	1.395044227	1.549231703	-1.27170831
ENSMUSG00000042599	Kdm7a	1.308522127	1.545562365	-1.171988595
ENSMUSG00000031137	Fgf13	1.268552229	1.537266242	-1.184140386
ENSMUSG00000041961	Znrf3	1.616055561	1.534306839	-1.554512481
ENSMUSG00000020134	Peli1	1.300818987	1.53384283	1.08185986
ENSMUSG00000031309	Rps6ka3	1.667626554	1.53208449	-1.05203863
ENSMUSG00000020198	Ap3d1	1.448209079	1.511043926	1.02235682
ENSMUSG00000029016	Clcn6	1.548078619	1.5039673	1.092543915
ENSMUSG00000024642	Tle4	1.376390815	1.503573027	-1.193613766
ENSMUSG00000006585	Cdt1	1.476242162	1.474086413	1.111798415
ENSMUSG00000020941	Map3k14	1.382172615	1.467698363	-1.475561447
ENSMUSG00000026464	Zc3h11a	1.262214148	1.463216684	1.115516876
ENSMUSG00000003382	Etv3	1.24487937	1.44431808	-1.309482391
ENSMUSG00000027394	Ttl	1.390026705	1.442646129	1.071066102
ENSMUSG00000022387	Brd1	1.28245713	1.430638627	-1.12757029
ENSMUSG00000026361	Cdc73	1.396501729	1.42101281	1.135182151
ENSMUSG00000025612	Bach1	1.32784858	1.420055711	-1.165951833
ENSMUSG00000027522	Stx16	1.29407602	1.418086661	1.181498092
ENSMUSG00000049470	Aff4	1.325354751	1.396103288	-1.127437649
ENSMUSG00000078515	Ddi2	1.299912982	1.390122576	1.06998946
ENSMUSG00000026288	Inpp5d	1.327572886	1.387980068	1.170072496

ENSMUSG00000025583	Rptor	1.53709262	1.381652415	1.120688701
ENSMUSG00000051675	Trim32	1.216310022	1.37186213	-1.07658812
ENSMUSG00000045005	Fzd5	1.205762729	1.363341439	1.118656148
ENSMUSG00000021277	Traf3	1.287966483	1.357344162	1.151881702
ENSMUSG00000003882	Il7r	1.204859507	1.352716094	-1.289626916
ENSMUSG00000021488	Nsd1	1.337974138	1.345900558	1.024598788
ENSMUSG00000001280	Sp1	1.341300231	1.341849323	1.176540669
ENSMUSG00000026335	Pam	1.434857733	1.328979776	1.157721514
ENSMUSG00000037926	Ssh2	1.24064617	1.324864274	-1.091289633
ENSMUSG00000069895	Atxn11	1.489072946	1.318525104	1.196667726
ENSMUSG00000003345	Csnk1g2	1.316242673	1.313048922	-1.006804118
ENSMUSG00000026028	Trak2	1.344302542	1.30566628	1.015419713
ENSMUSG00000039615	Stub1	1.308449442	1.29151876	1.017423574
ENSMUSG00000037824	Tspan14	1.299464346	1.287960207	-1.443989648
ENSMUSG00000057230	Aak1	1.22066489	1.278568247	-1.13042255
ENSMUSG00000094483	Purb	1.224462143	1.277469857	1.105740188
ENSMUSG00000074748	Atxn7l3b	1.244765112	1.277197045	1.039735064
ENSMUSG00000040848	Sft2d2	1.365935348	1.275904191	-1.000255111
ENSMUSG00000032846	Zswim6	1.230379047	1.274611604	1.144202253
ENSMUSG00000043411	Usp48	1.209453565	1.274201552	1.067266717
ENSMUSG00000032035	Ets1	1.247165375	1.258059678	-1.09858344
ENSMUSG00000033237	Arid2	1.317316892	1.24794774	-1.054503717
ENSMUSG00000055200	Sertad3	1.312583043	1.238857869	1.11202553
ENSMUSG00000074221	Zfp568	1.225266054	1.216741478	-1.359511608

**Supplemental Table S4, related to Figure 6. shRNA targeting sequences and quantitative PCR (qPCR) Primers.**

<b>Gene</b>	<b>Targeting sequence</b>	
Fosl2	TCCTAGTGAGCTTCCTTCTT	
Peli1	ACGGTGGTGGTTGAATATACT	
<b>Gene</b>	<b>Forward Primer Sequence</b>	<b>Reverse Primer Sequence</b>
BCL6	CCTGTGAAATCTGTGGCACTCG	CGCAGTTGGCTTTGTGACG
CXCR5	GACCTTCAACCGTGCCTTCTC	GAACCTGCCCTCAGTCTGTAATCC
IL21	GCTCCACAAGATGTAAAGGGGC	CCACGAGGTCAATGATGAATGTC
ICOS	CAGGAGAAATCAATGGCTCGG	TTGGTCTTGGTGAGTCGCAG
NFE2L2	TAGATGACCATGAGTCGCTTGC	GCCAAACTTGCTCCATGTCC
RPTOR	TTTGTCTACGACTGTTCCAATGC	GCTACCTCTAGTTCCCTGCTCC
FOSL2	CCAGCAGAAGTCCGGGTAG	GTAGGGATGTGAGCGTGGATA
PELI1	GCCCCAGTAAAATATGGCGAA	CCCCATTGCCTTAGGTCTTT
L32	AAGCGAAACTGGCGGAAAC	TAACCGATGTTGGGCATCAG